September 18, 2012

# INTERNET2 GLOBAL PARTNERS UPDATE

EDWARD MOYNIHAN

PROGRAM MANAGER, GLOBAL PROGRAMS

# Update: Global Challenges

- Ensure access to globally distributed science facilities (LHC, ITER, Gemini)

- Support Internet2 members deploying campuses overseas

- Facilitate development of coherent, global network capabilities, architectures that support growing collaborations

- Strengthen and support existing global partnerships and projects

- Expand support for development of national R&E networks in countries important to members

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# Internet2 Global Programs

- 2012 – "Repositioning" of Internet2 International Relations as Internet2 Global Programs.

  - Reviewing and repositioning staff and key projects

  - Ann Doyle as Interim Director

  - Management: Edward Moynihan, Dale Finkelson

  - Expanded consulting pool for strategy and for geographic focus

    » Europe -  Erik-Jan Bos

    » Asia/Pacific Rim – Jim Williams, Shuigen Xiao

    » Middle East – John Chapman

    » Latin America/Caribbean – Heidi Alvarez

    » Africa – ? (Bos and Doyle for now)

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**AMERICAS**
CANARIE (Canada)CEDIA (Ecuador)
CNTI (Venezuela)
CR2Net (Costa Rica)
CUDI (Mexico)
INNOVA|RED (Argentina)
REUNA (Chile)
RNP [FAPESP] (Brazil)
SENACYT (Panama)

**MULTI-NATIONAL**
AAU (Africa)
APAN (Asia - Pacific)
CKLN (Caribbean)
CLARA (Latin America and Caribbean)
DANTE (Europe)
NORDUnet (Nordic Countries)
TERENA (Europe)
UbuntuNet Alliance (Africa)
University of the West Indies (Caribbean)

**EUROPE**
ARNES (Slovenia)
BELNET (Belgium)
CARNET (Croatia)
CESnet (Czech Republic)
DFN (Germany)
FCCN (Portugal)
GARR (Italy)
RENATER (France)
GRNET (Greece)
HEAnet (Ireland)
HUNGARNET (Hungary)
JISC, JANET (United Kingdom)
PSNC, PIONIER (Poland)
RedIRIS (Spain)
RESTENA (Luxemburg)
RIPN (Russia)
SANET (Slovakia)
SURF (Netherlands)
SWITCH (Switzerland)

**ASIA and PACIFIC RIM**
AARNet (Australia)
ANF (Korea)
CDAC, ERNET (India)
CERNET, CSTNET, NSFCNET (China)
JAIRC (Japan)
JUCC (HongKong)
MYREN, MDeC (Malaysia)
NECTEC, UniNet (Thailand)
NREN (Nepal)
PERN (Pakistan)
REANNZ (New Zealand)
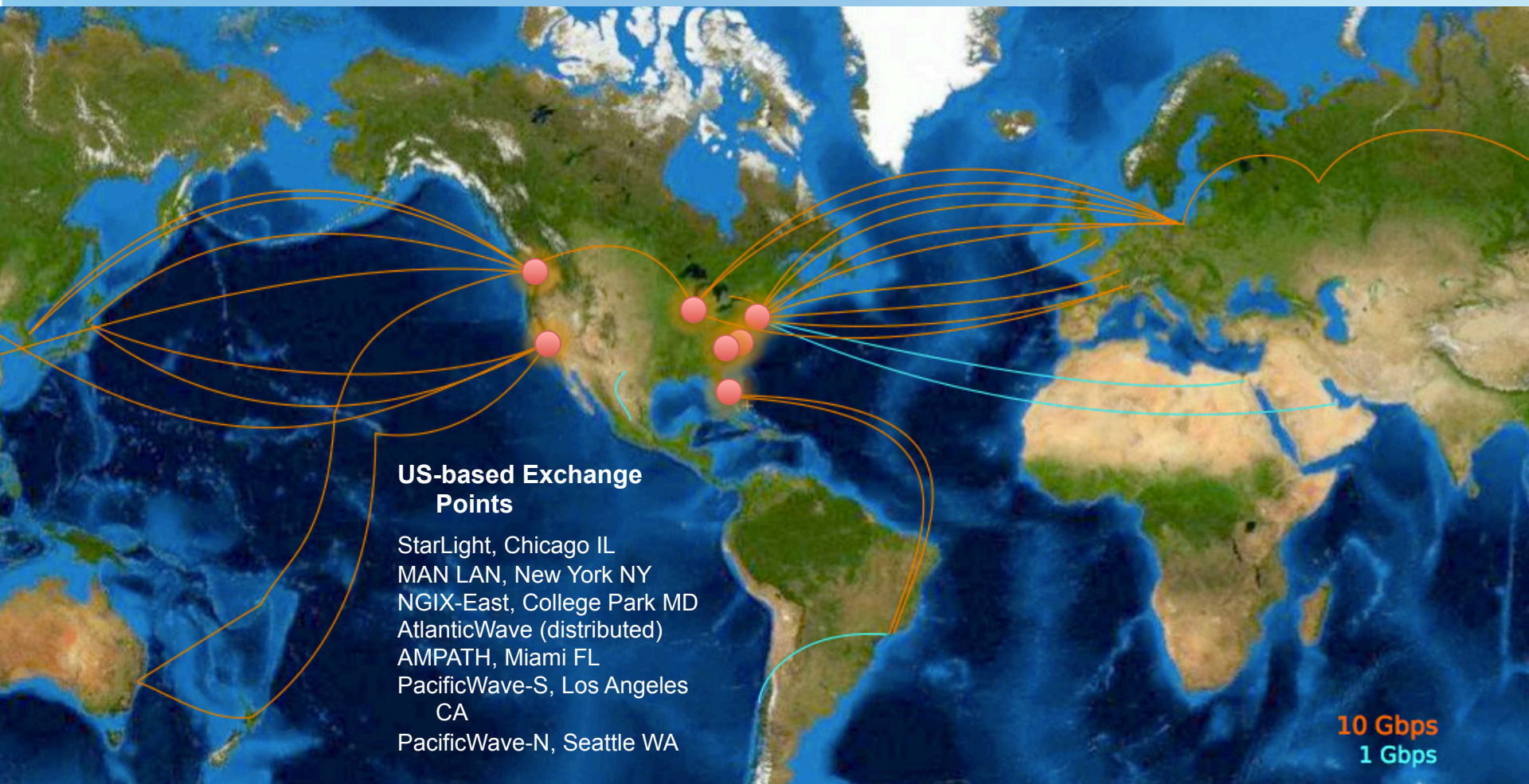SingAREN (Singapore)
TWAREN (Taiwan)
VinaREN (Vietnam)

**MIDDLE EAST and GULF STATES**
ANKABUT (UAE)
Israel-IUCC (Israel)
MCIT [EUN, ENSTINET] (Egypt)
Qatar Foundation (Qatar)
KACST (Saudi Arabia)

**AFRICA**
TENET (South Africa)
TERNET (Tanzania)
NUC (Nigeria)

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# US-based International Exchange Points



**US-based Exchange Points**

StarLight, Chicago IL
MAN LAN, New York NY
NGIX-East, College Park MD
AtlanticWave (distributed)
AMPATH, Miami FL
PacificWave-S, Los Angeles
   CA
PacificWave-N, Seattle WA

10 Gbps
1 Gbps

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# Current Networks Reachable

**AFRICA**
Algeria (ARN)
Egypt (EUN / ENSTINET)
Kenya (KENET)
Morocco (MARWAN)
South Africa (TENET)
Tanzania (TERNET)
Tunisia (CCK)
Uganda (RENU)

**AMERICAS**
Argentina (INNOVA|RED)
Brazil (RNP2/ANSP)
Canada (CAnet 4)
Chile (REUNA)
Colombia (RENATA)
Costa Rica (CR2Net)
Ecuador (CEDIA)
El Salvador (RAICES)
Guatemala (RAGIE)
Mexico (CUDI)
Panama (RedCyT)
Peru (RAAP)
Trinidad (UWI)
Uruguay (RAU2)
Venezuela (Reacciun2)

**ASIA and PACIFIC**
Australia (AARNet)
Bhutan (BdREN)
Cambodia (CamREN)
China (CERNET2, CSTNET, NSFCNET)
Hong Kong (HARNET)
India (ERNET)
Indonesia (ITB)
Japan (SINET3, WIDE, JGN2)
Korea (KOREN, KREONET2)
Laos (LERNET)
Malaysia (MYREN)
Nepal (NREN)
New Zealand (KAREN)
Pakistan (PERN)
Philippines (PREGINET)
Singapore (SingAREN)
Sri Lanka (LEARN)
Taiwan (TANet2, ASnet)
Thailand (UniNet, ThaiSARN3)
Vietnam (VinaREN)

**CENTRAL and SOUTHWEST ASIA**
Armenia (ASNET-AM)
Azerbaijan (AzRENA)
Georgia (GRENA)
Kyrgyz Republic (AKNET)
Tajikistan (TARENA)
Turkey (ULAKBIM)
Turkmenistan (TuRENA)

**EUROPE**
Albania (ASA / INIMA)
Andorra (Univ. of Andorra)
Austria (ACOnet)
Belarus (BASNET, UNIBEL)
Belgium (BELNET)
Bosnia-Herzegovina (BIHARNET)
Bulgaria (ISTF)
Croatia (CARNET)
Cyprus (CyNET)
Czech Republic (CESnet)
Denmark (Forskningsnettet)
Estonia (EENet)
Finland (Funet)
France (RENATER)
Germany (X-WiN)
Greece (GRNET)
Hungary (NIIF/HUNGARNET)
Iceland (RHnet)
Ireland (HEAnet)
Italy (GARR)
Latvia (LATNET)
Lithuania (LITNET)
Luxembourg (RESTENA)
Macedonia (MARNet)
Malta (UofM/RicerkaNet)
Moldova (RENAM)
Montenegro (MREN)
Netherlands (SURFnet)

**EUROPE cont'd**
Norway (UNINETT)
Poland (PIONIER)
Portugal (FCCN)
Romania (RoEduNet)
Russian Federation (RBnet, RUNNET)
Serbia (AMRES)
Slovakia (SANET)
Slovenia (ARNES)
Spain (redIRIS)
Sweden (SUNET)
Switzerland (SWITCH)
Ukraine (URAN)
United Kingdom (JANET)
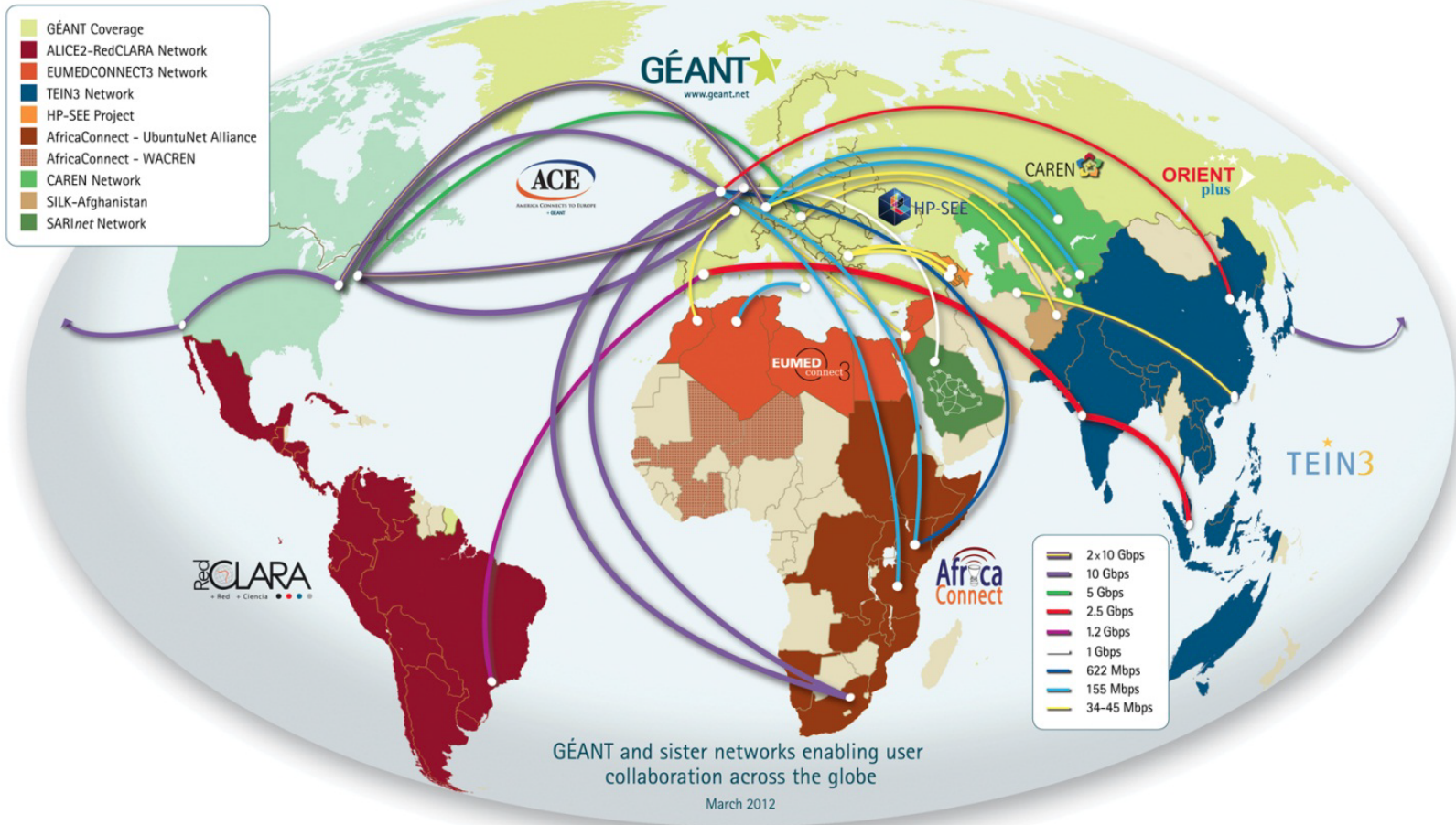
**MIDDLE EAST and GULF STATES**
Israel (IUCC)
Jordan (JUNet)
Palestinian Territories (Birzeit Univ./
     Al-Quds Open Univ.)
Qatar (Qatar FN)
Syria (HIAST)
United Arab Emirates (ANKABUT)
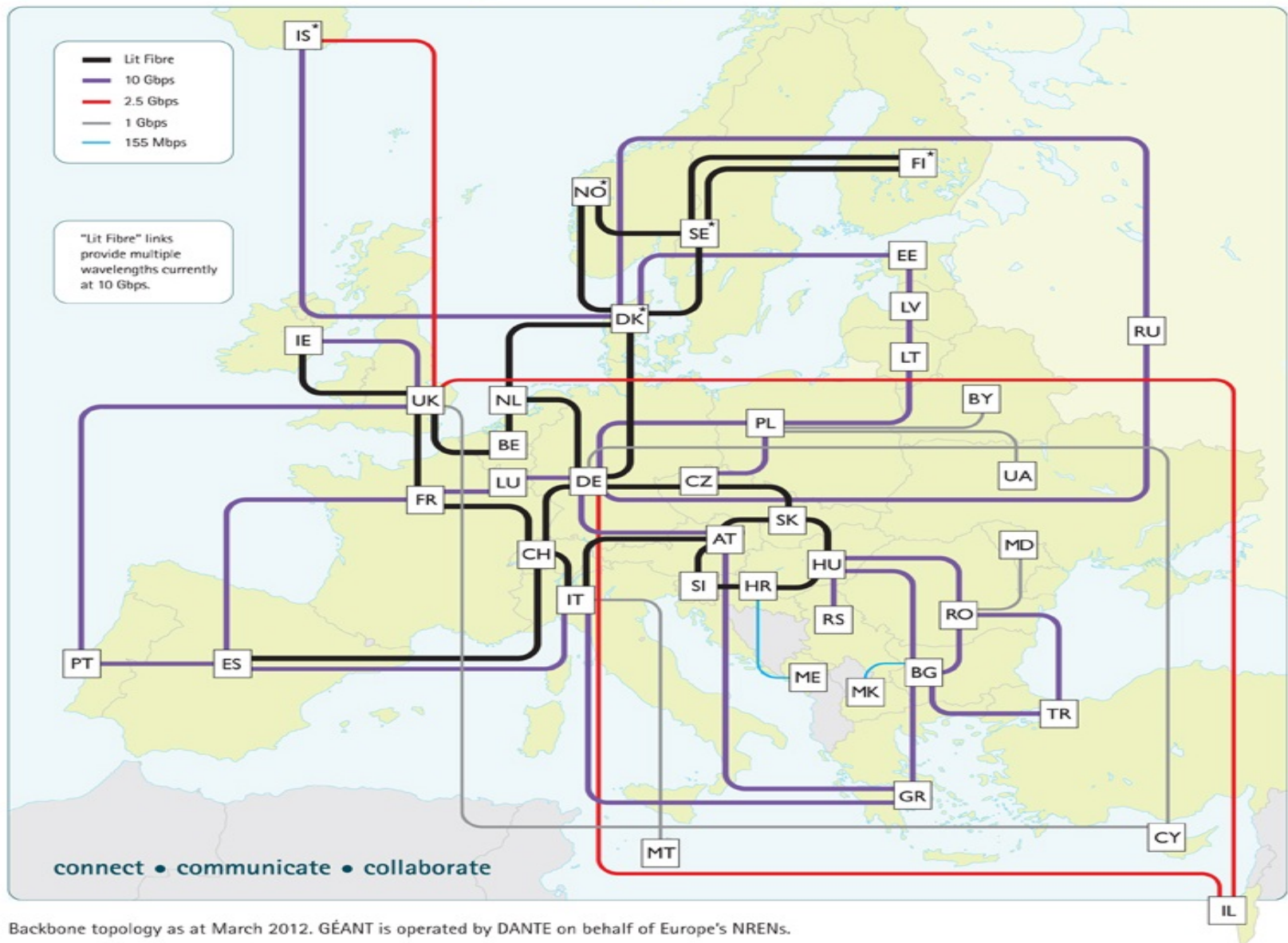
**MULTINATIONAL NETWORKS**
APAN
GEANT2
NORDUnet
redCLARA
UbuntuNet

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# GEANT International



GÉANT and sister networks enabling user collaboration across the globe

March 2012

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# GEANT



Backbone topology as at March 2012. GÉANT is operated by DANTE on behalf of Europe's NRENs.

# European Highlights

- Over the past two years, the capacity of GEANT's global IP interconnections increased from ~34Gbps to nearly ~73Gbps.

    - The growth arises from upgrades or new IP interconnections with North America (ACE), Latin America, Sub-Saharan Africa, the South Caucasus, Central Asia and Taiwan.

    - Global point-to-point connectivity also rose from 20Gbps to 30Gbps following the implementation of point-to-point connectivity to the UbuntuNet Alliance in Africa

- London Open LightPath Exchange is progressing – equipment has been delivered –installation is happening any day, including new gear at the London POP
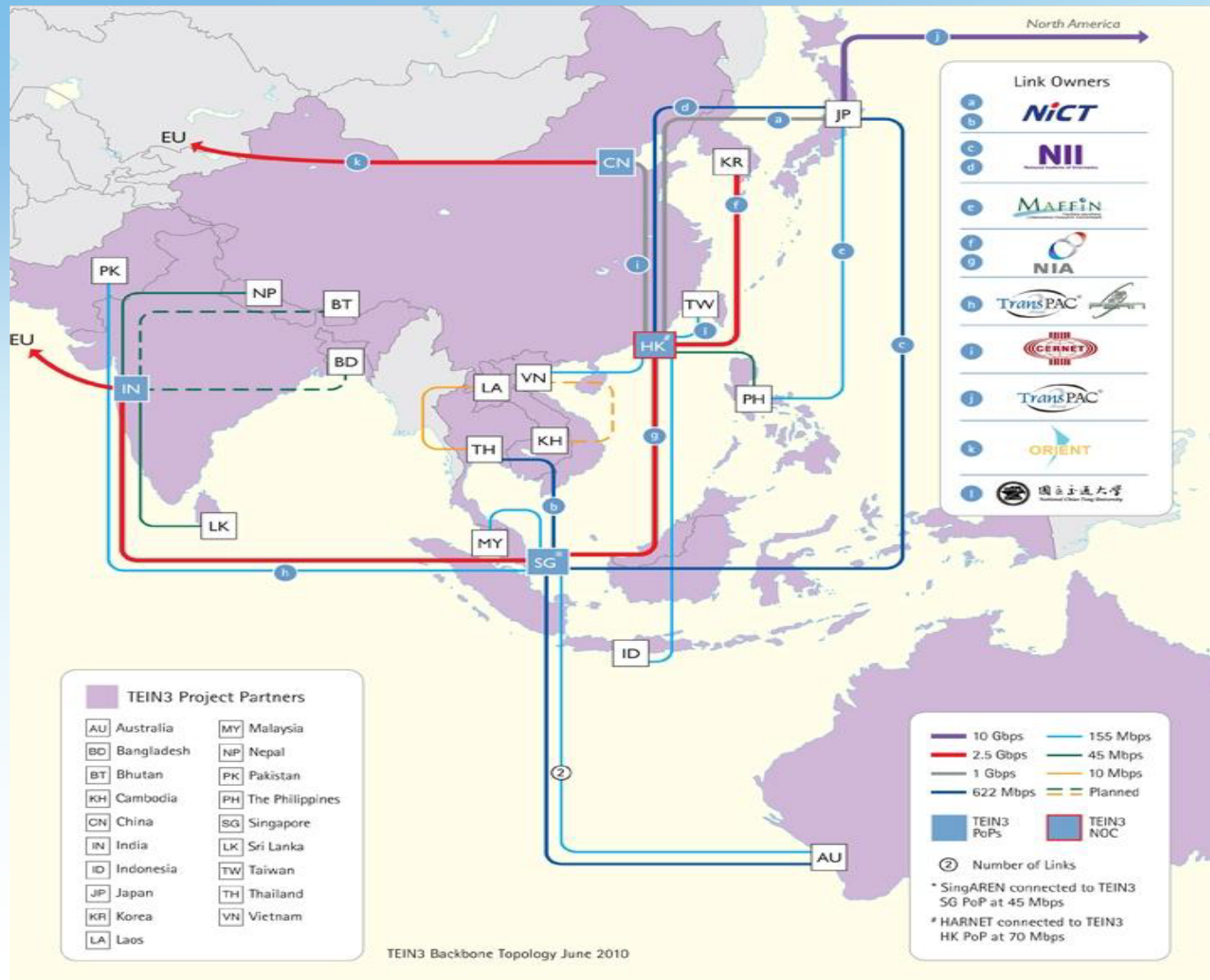
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# APAN



Asia-Pacific Backbone Topology
by funding source

Asia Pacific
United States
Europe

As of Jan. 5th 2011

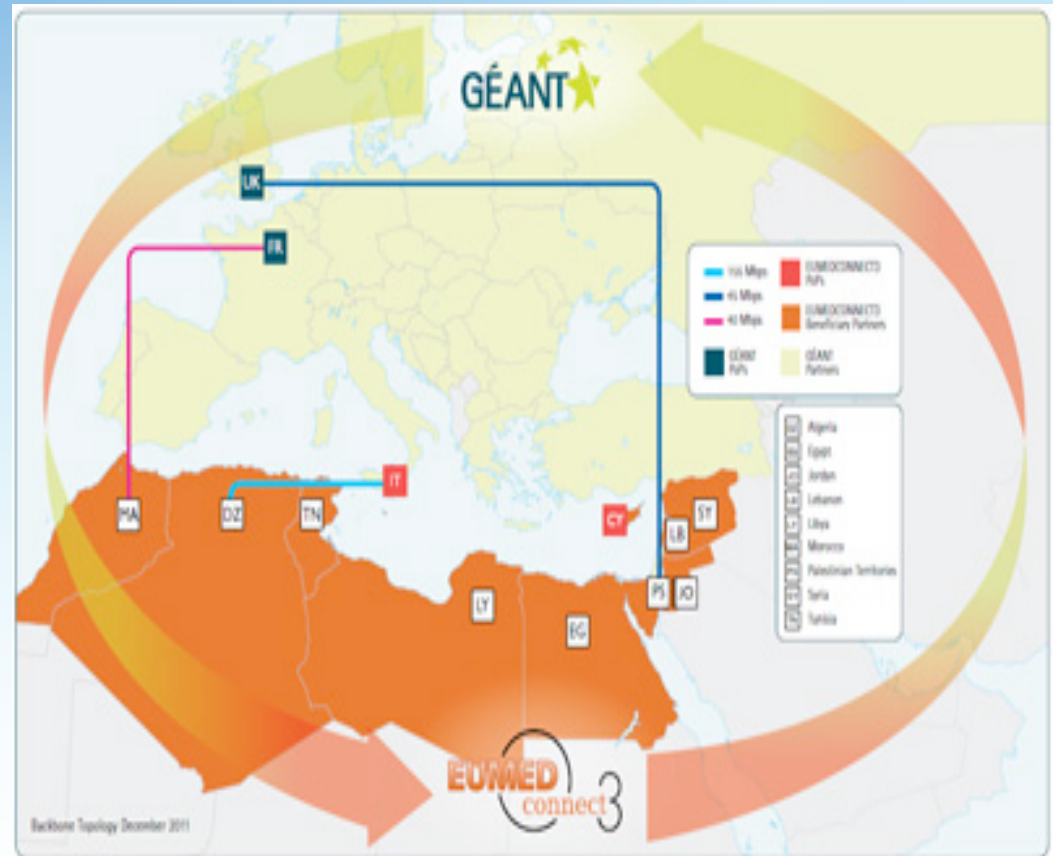# TEIN3/TEIN4



TEIN3 Backbone Topology June 2010

# Asia/Pacific Highlights

- The EU has relinquished TEIN to its user members; TEIN4

- 10gb connection from Los Angeles to Beijing – successful demo of this link in June – CANS meeting in October as a follow-up


Note: Plan for connecting South Pacific Islands and Lower Mekong underway
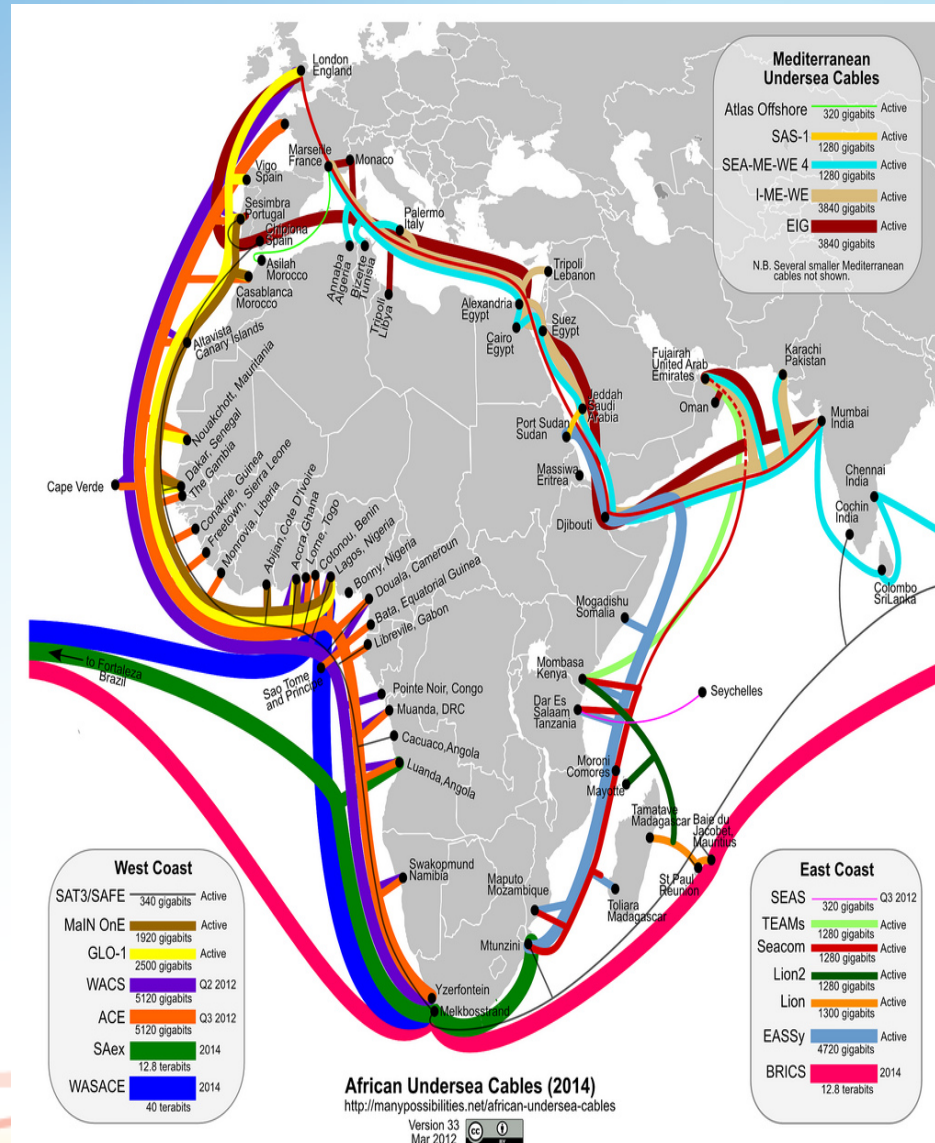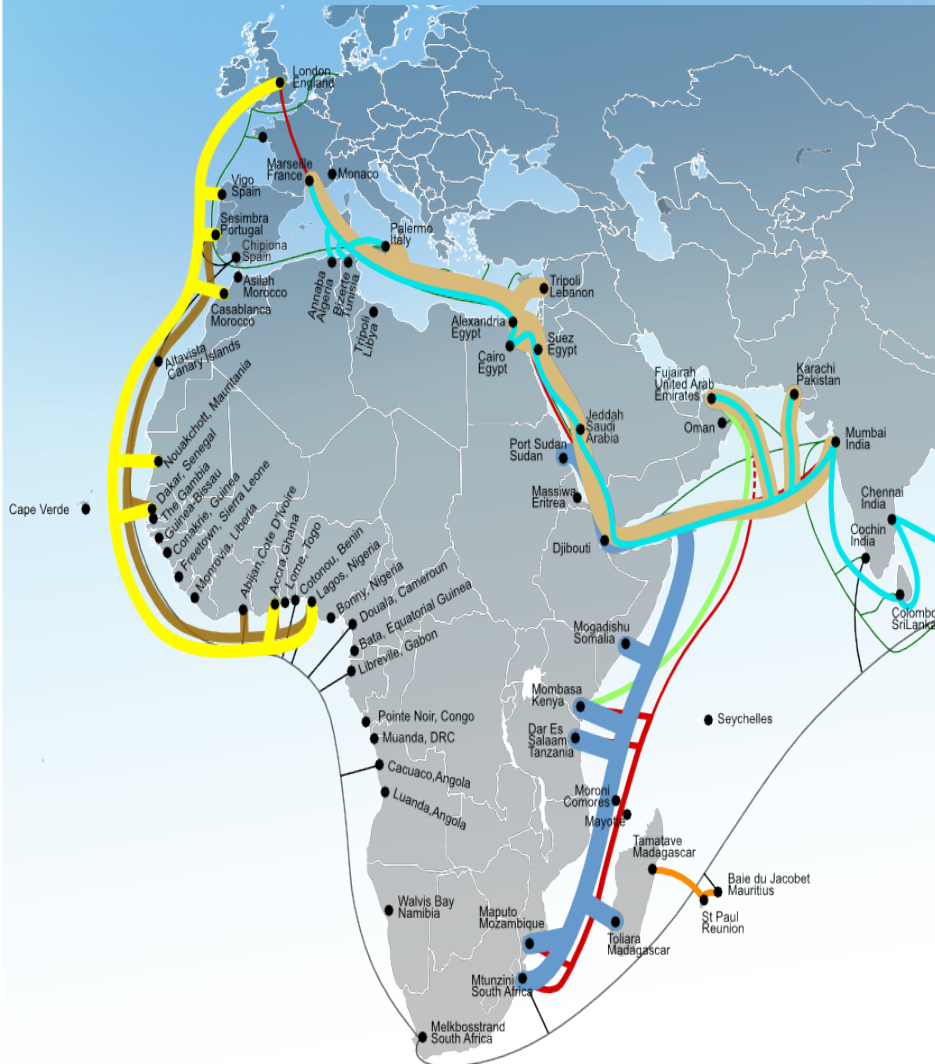
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# Middle East

- EUMedConnect
  - project funded by the EU; direct links from participating NRENs to GEANT

- ASREN - Arab States Research and Education Network
  - Launched in December 2010
  - Can be considered as expansion of EUMedConnect (connection of Mediterrean countries to GEANT)

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# Middle East Highlights

- Most noteworthy happening is the SIG meeting (Sept. 17th) along with Ankabut and EUMedConnect meetings (Sept. 18th-19th).

- Oman is making progress towards an NREN

- New Partner Saudi Arabia has been quiet.

- Jordan- JUnet cannot connect to EUMedconnect until government becomes more stable.

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# Africa: Emerging Quickly 2011 - 2014

# UbuntuNet Alliance

Eb@le, DRC
EthERNet, Ethiopia
*KENET, Kenya
*MAREN, Malawi
*MoRENet, Mozambique
XNet, Namibia
*RwEdNet, Rwanda
SomaliREN, Somalia
SUIN, Sudan
*TENET, South Africa
TERNET, Tanzania
RENU, Uganda
ZAMREN, Zambia

Members NRENs
Communication established
and NRENs in Construction

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# UbuntuNet Highlights

- KENET has a new connection coming into Amsterdam – 600MB

- ZAMREN and TENET form the first UbuntuNet cross-border link

- Push for local exchange points
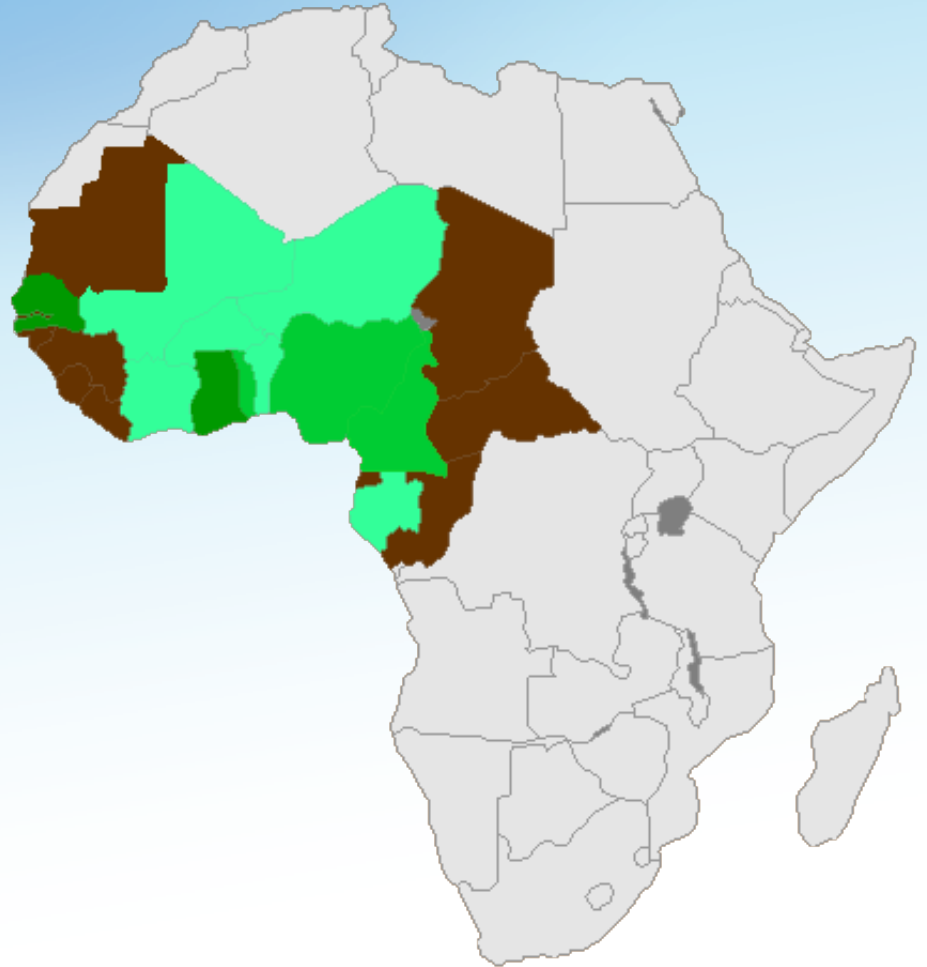
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# WACREN

WACREN: West and Central African Research and Education Network

Potential membership base: NRENs in the 22 West and Central African countries

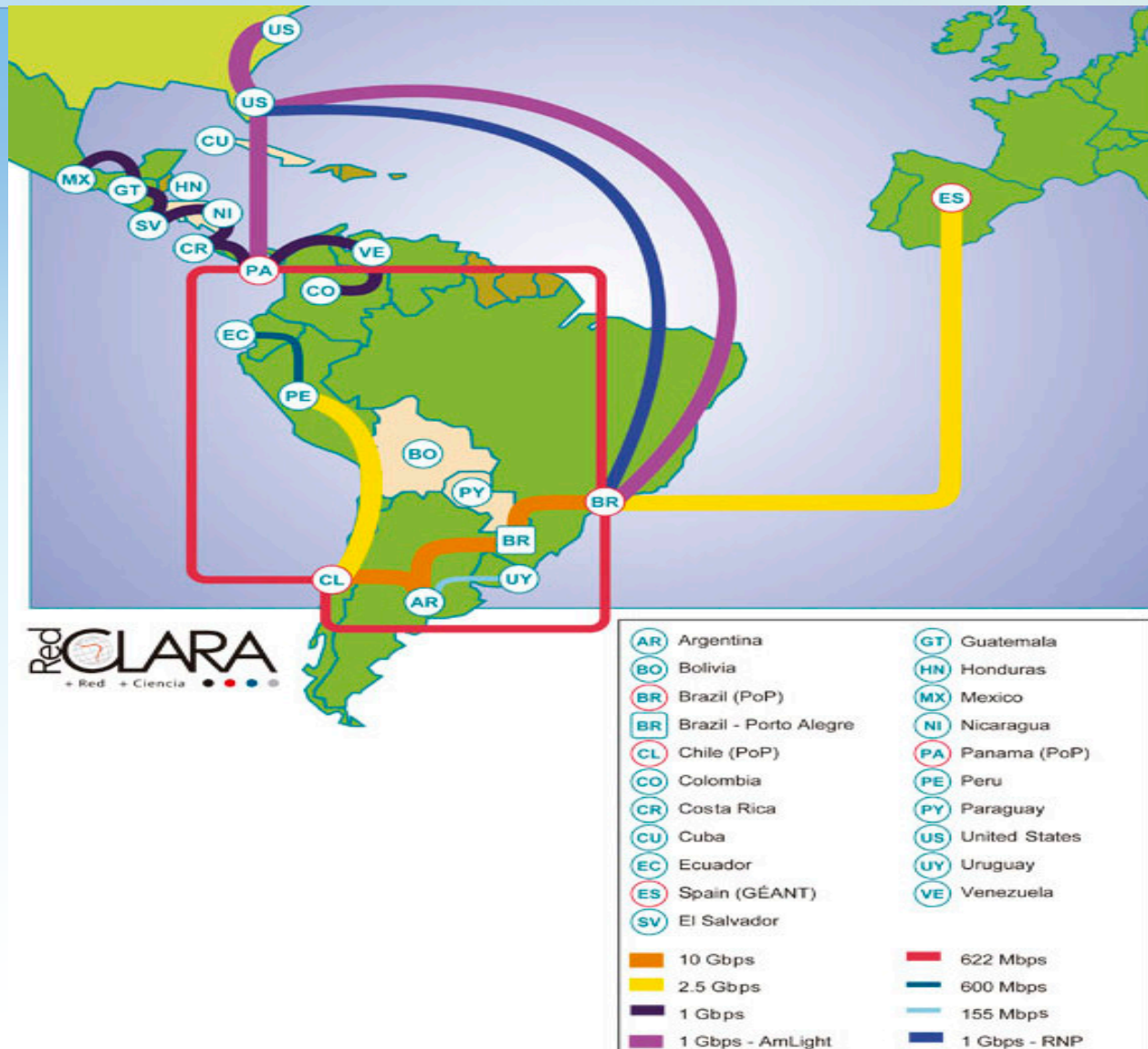WACREN formally registered in August 2010

Board elected in March 2011

Strategic Plan being developed

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# WACREN Highlights

- WACREN NOC to GEANT through RENATER (French NREN) now functional out of Senegal

- TogoREN launched July 2012

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# South America- RedCLARA/Alice2

# C@ribNET

**Member States**
Anguilla
Antigua & Barbuda
Bahamas
Barbados
Belize
Bermuda
British Virgin Islands
Cayman Islands
Dominica
Dominican Republic
Grenada
Guyana
Haiti
Jamaica
Montserrat
St. Kitts & Nevis
St. Lucia
St. Vincent
Suriname
Trinidad & Tobago
Turks & Caicos

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# Latin and South America Highlights

- CKLN completed the construction of C@ribNET and linked the Caribbean to the global community of research and education networks

- Trinidad and Tobago Research and Education Network, TTRENT launched

- OpenFlow now being deployed on AmLight East between Miami and Sao Paulo.

- Cudi (Mexico) connectivity plans to move from San Antonio to El Paso to co-located with the US-UCAN PoP.  This will be discussed with interested parties in Philadelphia at the I2 Fall Members Meeting.

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# Summary

- Global R and E connectivity continues to grow

- Greater focus on global required to serve members needs

- Opportunities exist for the US to become a global leader

  * Challenge – Creating a collaborative environment for solving common challenges, developing common solutions

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# Thanks!

- Questions, Corrections, Concerns?

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